

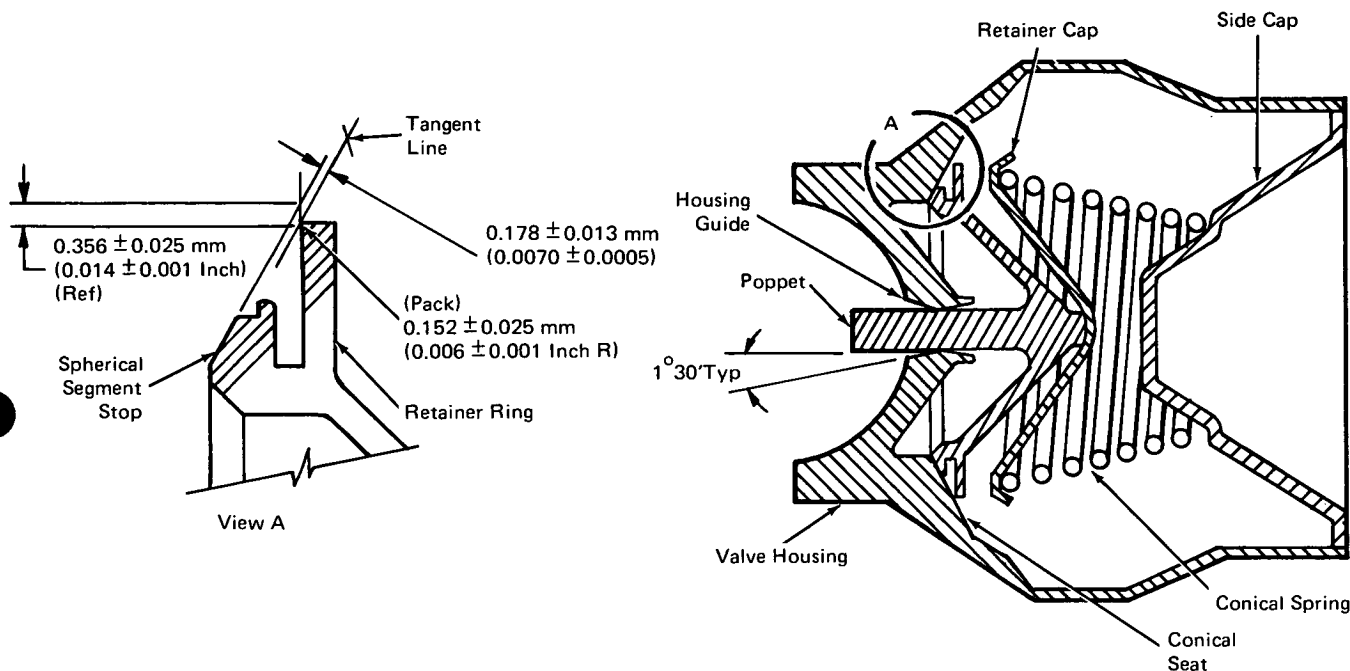
NASA TECH BRIEF

Manned Spacecraft Center



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Self-Aligning, Low-Pressure Sealing Poppet Valve



The problem:

Certain arrangements in fluid flow control require valves that are actuated by very low differential pressures. However, most of the existing valves designed for this purpose do not achieve the desired precision.

The solution:

A poppet valve was designed which offers accurate and reliable performance under low differential pressures.

How it's done:

The design, as shown in the figure, allows the poppet to be free to rotate and oscillate through a universal single point contact between the housing guide and the poppet shaft. The universal pivot point arrangement allows the spherical segment of the poppet to seal against the conical sealing surface of the valve housing at angles

up to 1 degree, 30 minutes. A conical spring provides the force to close the poppet at low pressure differentials and allows adjustment of the poppet so it seats concentrically along its longitudinal axis. In the no flow direction, leakage is controlled to a maximum of 1×10^{-4} standard cm^3/sec of helium at pressure differentials of $3.45 \times 10^3 \text{ N/m}^2$ (0.5 psi), while opening in the flow direction at a pressure of $20.7 \times 10^3 \text{ N/m}^2$ (3.0 psi) maximum. It should be noted that leakage rates are reduced appropriately with fluids having greater molecular weights than helium.

Notes:

1. This design may be used in fluid flow control in petroleum, chemical, and aircraft applications which require low leakage rates and activation at low pressure differentials.

(continued overleaf)

2. Requests for further information may be directed to:

Technology Utilization Officer
Manned Spacecraft Center
Code JM7
Houston, Texas 77058
Reference: TSP72-10538

Patent status:

NASA has decided not to apply for a patent.

Source: R. Gonzalez and
W. A. Bratfisch of
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